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Simple Sump Pump Controller

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After one too many flooded basements, the author of this design was fed up. The mechanical float switch for the sump pump, which pumps the water from the washing machine up to the sewer level, was increasingly often jammed by caked-on detergent. It seemed like a good idea to replace this switch by an electronic version with two sensors. In order to avoid unnecessary effort, an existing *Elektor Electronics* circuit was taken as a model, namely the ‘simple moisture detector’ in the December 1998 issue. This was equipped with two sensors: one for the lower level of the water in the sump in which the pump is located, and one for the upper level.

In the original circuit, input 1 of IC1a is used for a manual reset switch. In the new version, this switch is replaced by a second sensor (S1), which detects the *low* water level for the sump pump. Sensor S2 is naturally used to detect the high level.

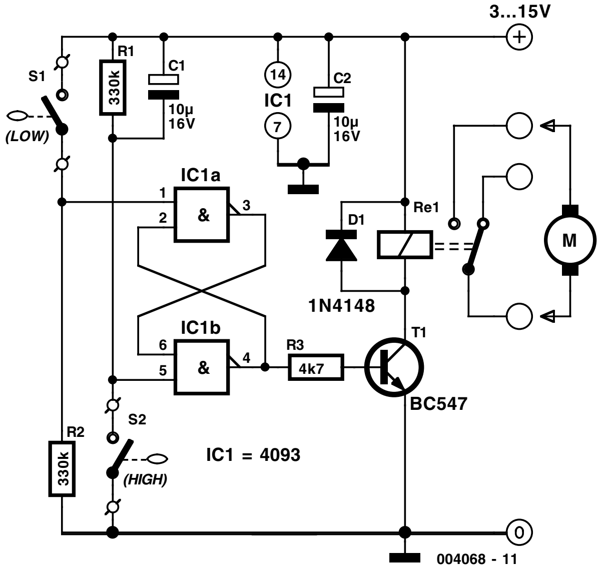
It all works very simply. If the water rises above the level of the high-level sensor S2, input 5 goes to ‘0’, which causes output 4 to go to ‘1’ and the relay to be energised. This in turn activates the pump, which will cause the water level to drop. If the water level drops to somewhere between S1 and S2, nothing changes and the pump continues to run. The flip-flop holds the relay engaged. However, as soon as the water drops below the low-level sensor S1, so that S1 no longer conducts, input 1 will no longer pulled ‘high’ and will drop to zero. The flip-flop will be reset, and the relay will drop out.

The relay contacts are connected in series with the main power cable of the sump pump. The original (defective) float switch is set to a permanently closed position, so that the pump always runs whenever voltage is applied to the supply cable.

Each of the sensors is made from two pieces of mains distribution wire mounted approximately 1 cm apart, with the insulation stripped from the lower ends.

Based on experiments, the series resistor for the two sensors (R1) was reduced from 1 MΩ to 330 kΩ. This is because the sensors do not have to detect moisture, as in the original circuit, but come fully in contact with the water.

The prototype is powered by a standard 6-V mains adapter. The relay is a normal 6-V DC type with double-pole contacts rated at 250 V.



The circuit is so simple that it can be very quickly put together on a piece of prototyping board. Naturally, you must be careful with the connections between the relay and the 240-V mains cable for the pump. Thoroughly isolate the connections, and make sure that there is adequate separation between the individual AC connectors and between the connectors and the rest of the circuit.

This controller has worked several months in the author’s house with no problems. Flooded basements appear to be definitely a thing of the past.

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